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ELS Manager's Telecon February 2005

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ELS MANAGER'S TELECON

FEBRUARY 2005

3/2/06

Center Members to Habitation 2006, February 6-8

- The center sponsored a total of 14 trainees and faculty (27%) at the conference. Those attendees offered their research findings in the form of presentations and posters.

Education and Outreach

- Dave Kotterman presented "Exploring: How Will We Live on Other Planets?" at the Blue and Gold Boy Scout Banquet on February 28 at Burnett Creek Elementary School. 75 total scouts and their parents were in attendance.

February's SIMA Telecon

- Selen Aydogan, ALS NSCORT Systems Group Phd Candidate in Chemical Engineering, gave a presentation entitled "An Optimization Framework to Design Life Support Systems" on February 16th.

February's System Group Meeting

- The Systems Group met on February 15th to discuss what are the expected deliverables from the group. Emphasis was placed on the scope and breadth of each deliverable and plans were discussed as to how to achieve these between now and September 30th.

Featured Research Project

Dr. Lisa Mauer

Novel Storage and Packaging Operations

Radiation effects on oils and antioxidants project:

- Radiation treatment, storage, and analysis of primary lipid and antioxidant samples continuing. Data interpretation is ongoing.
- Continuing M.S. graduate student, Jake Gandolph, is preparing to graduate in the spring. Jake presented his work at Habitation.
- Results in soybean and peanut oils indicate that there is a minimal loss of essential fatty acids during the stored samples measured so far, and oxidation levels in these oils are much lower than the fish oil investigated earlier (as expected). Vitamin E levels will be measured, and a sensory evaluation will be conducted as part of this study.
- The addition of 0.02% TBHQ (an antioxidant) to soy bean oil was effective in delaying and/or reducing lipid oxidation, extending the shelf-life of the product. During storage, TBARS and CD values significantly increased for all radiation doses; however, maximum TBARS and CD values were significantly less in SBO with TBHQ. No differences in the fatty acid profiles of the control and irradiated soy bean oil with and without TBHQ were detected over 56 days of storage at 65°C.
- Studies investigating effects of radiation on antioxidant stability found that, in solution, vitamin C is affected by radiation doses; however, in dry supplement powder or tablet form, the vitamin C concentration and antioxidant capacity are relatively stable in the conditions used.

- Extrapolation of data to determine end of shelf-life for oils in space and to correlate antioxidant data to needs for supplementation and addition.

Radiation effects on wheat project:

- Work (proximate analysis and basic chemical composition) continued on characterizing Apogee and Perigee and comparing to 3 terrestrial wheat varieties known for quality bread and pasta production.
- Continuing M.S. graduate student, Adam Stoklosa, is preparing to graduate in the spring. He presented two posters at Habitation on his work.
- In a comparison of Apogee and Perigee dwarf wheats to wheat cultivars commonly used for food products (bread, pasta), analyses show differences between Perigee and Apogee cultivars and the terrestrial cultivars. Protein analysis shows unique banding on the SDS-PAGE as well as elevated levels of protein interaction and water absorption. Perigee and Apogee had better antioxidant capacity, but were also more susceptible to lipid oxidation. Starch analysis indicates that Perigee is susceptible to mechanical damage while the other four cultivars tested were not. Impacts of these differences on consumer acceptance have not been done due to restrictions related to growth conditions and pesticides used in the Purdue greenhouses.
- All wheat cultivars were also exposed to select levels of radiation then analyzed. Radiation affected protein structure and function for all cultivars, as demonstrated by fainter banding on the SDS-PAGE as radiation dose increased and decreased peak dough development time as radiation increased to 10 Gy with increasing times at higher doses. AFM images illustrate dramatic differences in gliadin structure between 0 and 10 kGy. The antioxidant capacities of Apogee and Perigee were initially higher but decreased with radiation exposure while other cultivars were not significantly impacted. Lipid oxidation increased as radiation dose increased. Starch analysis indicated that Perigee starch is susceptible to mechanical and radiation damage while the other four cultivars were not. These results indicate that low doses of radiation affect structure and function of wheat. Further studies are needed to determine the magnitude of radiation effects on food quality and acceptability.